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(54) Display apparatus

(57) A display apparatus to store a broadcasting signal or a video signal and/or an audio signal in an external storage medium, and reproduce signals from the external storage medium includes a receiving processor, a controller, and an output unit. The receiving processor receives a video signal and/or an audio signal. The controller stores a video signal and/or an audio signal received using the receiving processor in the external storage medium in real time, if a user requires storage of

the received video signal and the audio signal. The controller reproduces the stored video signal and/or audio signal from the external storage medium if the user requires reproduction of the video signal and/or the audio signal stored on the external storage medium. The output unit outputs the reproduced video signal and/or audio signal.

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Description

[0001] The present invention relates a display apparatus comprising an audio and/or video signal input means, audio and/or video processing means for processing audio and/or video signals from the audio and/or video signal input means to produce a perceivable output, control means and user input means.

[0002] It is known for an LCD display device to be usable as the monitor of a computer and a television. It is also known to disclose loudspeakers in such devices for outputting audio.

[0003] However, such multifunction display devices cannot store and playback video signals, e.g. received television programmes. Accordingly, to perform the storage and reproduction of a video signal, the user must operate a PC connected to the display device. The user must individually operate appropriate programs, loaded into the PC, whenever video recording or playback is required. Also, the PC must include a TV card in order to store a video signal or an audio signal received through the display device.

[0004] A display apparatus, according to the present invention is characterised by an interface for providing access to an external storage means, the audio and/or video processing means being configured for providing audio and/or video signals to the interface and to receive audio and/or video signals from the interface and the control means being responsive to operation of the user input means to effect transfer of audio and/or video signals to and from the audio and/or video processing means through the interface.

[0005] Preferably, the control means comprises a computer running an operating system program which enables the control means to mount an external filesystem via the interface.

[0006] Preferably, the audio and/or video processing means includes television receiving means.

[0007] The present invention may be implemented in a dual purpose television and computer monitor apparatus.

[0008] A display apparatus, according to the present invention, may be included in a system with a storage means communicatively connectable to the interface of the display device for the transmission and reception of audio and/or video signals.

[0009] Additional preferred and optional features are set forth in claims 6 to 53 appended hereto.

[0010] An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a block diagram of a display apparatus according to the present invention and a PC;
Figure 2 is a flowchart of an operating method for the display apparatus in Figure 1;
Figure 3 is a flowchart of another operating method for the display apparatus in Figure 1;

Figure 4 is a block diagram of another display apparatus according to the present invention and a PC; and

Figure 5 is a flowchart of an operating method for the display apparatus in Figure 4.

[0011] Referring to Figure 1, display system comprises an antenna 100, a display apparatus 110, a remote controller 130 and a personal computer (PC) 140. The antenna 100 receives broadcast signals including video and/or audio signals. However, it is understood that other types of signals may be received. Additionally, it is understood that other types of electronic devices, such as personal digital assistants and digital music/file players, such as MP3 players and digital video recorders, which can be connected to the display and store data, can be used instead of or in addition to the PC 140.

[0012] The display apparatus 110 comprises a video and audio signal receiving processor 111, a video signal processor 112, a display unit 113, an audio signal processor 114, a speaker 115, a compression and decompression unit 116, an information receiver 117, a central processing unit (CPU) 118, a Universal Serial Bus (USB) controller 119 and an On-Screen Display (OSD) information generator 120. The video and audio signal receiving processor 111 is controlled by the CPU 118 and receives broadcast signals through the antenna 100 and receives video signal and/or audio signals from an external audio/video (AV) device. Received video signals from the external audio/video (AV) device and the antenna 100 are output to the video signal processor 112 and the compression and decompression unit 116 respectively. The received audio signals from the external audio/video (AV) device and the antenna 100 are output to the audio signal processor 114 and the compression and decompression unit 116 respectively. The display apparatus 110 may be configured to receive audio and video signals from other sources instead of or in addition to the antenna 100 and the external audio/video device. The CPU 118 is not restricted to a particular type of microprocessor or processor.

[0013] The video signal processor 112 is controlled by the CPU 118. The video signal processor 112 processes at least one among the video signal transmitted from the video and audio signal receiving processor 111 and the video signal transmitted from the compression and decompression unit 116 for display on the display unit 113. As shown, the video signal processor 112 processes video signals transmitted from the video and audio signal receiving processor 111 and the video signal transmitted from the compression and decompression unit 116 so that the video signals can be displayed together in a display format from among various display formats such as a Picture-In-Picture (PIP) format, a Picture-By-Picture (PBP) format, etc. However, the video signal processor 112 need not do so in all embodiments of the invention.

[0014] The display format is determined by the CPU

118. The CPU 118 determines the display format according to a user's request (or user's command) received through the information receiver 117. The CPU 118 controls the video signal processor 112 so that the video signal can be displayed according to the determined display format. Also, the CPU 118 determines whether the video signal being stored on a storage medium 143 of the PC 140 should be displayed on the display unit 113, according to the user's request received through the information receiver 117, to control the video signal processor 112. If the user does not want to display the stored video signal, the CPU 118 controls the video signal processor 112 so that the stored video signal is not displayed on the display 113. However, if the user wants to display the stored video signal, the CPU 118 controls the video signal processor 112 so that the stored video signal is displayed on the display unit 113.

[0015] While described as being controlled by a user input, it is understood that the display format and/or the display of the stored video signal can be otherwise selected, such by means of in broadcast data received by the display apparatus 110 or in default display formats and/or display times used by the CPU 118. For instance, a condition for displaying video signals, being stored, on the display 113 can be set by default in some embodiments of the invention. For example, the CPU 118 controls the video signal processor 112 so that a stored video signal is displayed in real time on the display 113 unless the user inputs a separate command. However, it is understood that the default could also be to not display a stored video signal in real time or to display the stored video signal with a predetermined delay after the video signal is stored on the external storage medium 143.

[0016] In the shown embodiment, when a video signal and/or audio signal, stored in the storage medium 143, is reproduced, the CPU 118 controls the video signal processor 112 and the audio signal processor 114 so that the video and/or audio signals, received through the video and audio signal receiving processor 111, are output through the display unit 113 and/or the speaker 115 in real time.

[0017] The display unit 113 is a device, such as a liquid crystal display (LCD), an organic light-emitting diode (OLED) display, a plasma display device (PDP), a cathode ray tube (CRT) or any other device through which visual information can be conveyed.

[0018] The audio signal processor 114 processes received audio signals so that audio signals, transmitted from the video and audio signal receiver 111 or the compression and decompression unit 116, can be output through the speaker 115. Also, the audio signal processor 114 can process audio signals so that management information for the storage medium 143 of the PC 140 is output through the speaker 115, wherein the management information is provided from the CPU 118. The speaker 115 outputs the audio signal received from the audio signal processor 114. However, it is understood that if no audio signal is to be output by the display ap-

paratus 110 or if an external speaker is to be used, the audio signal processor 114 and/or the speaker 115 need not be included in the display apparatus 110.

[0019] The video signal processor 112, the display unit 113, the audio signal processor 114, and the speaker 115 are output units for outputting video signals and/or audio signals in the shown embodiment.

[0020] The compression and decompression unit 116 is controlled by the CPU 118. The CPU 118 sets the compression and decompression unit 116 to compression mode and decompression mode according to the desired function. If the compression and decompression unit 116 is set to compression mode, the compression and decompression unit 116 compresses the video and/or audio signals output from the video and audio signal receiving processor 111. The compression can be performed according to the MPEG-2 or MPEG-4 standards, by way of example, but can be any suitable compression method. The compressed video and/or audio signals are output to a Universal Serial Bus (USB) controller 119. While described in terms of USB, it is understood that other protocols, such as IEEE 1394 (FIREWIRE) or USB 2.0 could be used and that wireless protocols, such as 802.11a, b or g, could be used.

[0021] If the compression and decompression unit 116 is set to decompression mode, the compression and decompression unit 116 decompresses a video and/or audio signals received through the USB controller 119 into its original form. The compression and decompression unit 116 outputs the decompressed video and/or audio signal to the video signal processor 112. It is understood that, where compression is not used, the compression and decompression unit 116 need not be used. Additionally, if the video and/or audio signals are received in a compressed mode, only a decompression unit 116 is needed.

[0022] The information receiver 117 receives a user's request transmitted from the remote controller 130 or receives a user's request generated by operating a button (not shown) or a key (not shown) on a front panel of the display apparatus 110. The information receiver 117 transmits received user requests to the CPU 118. The CPU 118 is the controller for controlling the operation of the video and audio signal receiving processor 111, the video signal processor 112, the compression and decompression unit 116, the USB controller 119 and the OSD information generator 120, according to the user's requests, received through the information receiver 117.

[0023] If a user requires storage of a received video signal and/or audio signal, the CPU 118 controls functions of the display apparatus 110, including the compression and decompression unit 116 and the USB controller 119, so that the received video and/or audio signals are stored in the storage medium 143 of the PC 140 in real time.

[0024] If the user requires reproduction of video and/or audio signals, stored on the storage medium 143 of the PC 140, the CPU 118 controls functions of the dis-

play apparatus 110 including the compression and decompression unit 116 and the USB controller 119, so that the video and/or audio signals are reproduced.

[0025] While not required in all embodiments, it is to be understood that the method of Figure 2 may be performed by computer software used by the CPU 118.

[0026] Referring to Figure 2, if the CPU 118 receives a control request for the storage medium 143 of the PC 140 from the information receiver 117 in operation 201, the CPU 118 controls the OSD information generator 120 in operation 202. The OSD information generator 120 generates OSD information, including information to be required or input by a user, to perform the control for the storage medium 143. The generated OSD information is output to the display unit 113 and displayed on the display 113.

[0027] If a user requires a function using a remote controller 130 with reference to the OSD information, the information receiver 117 receives and transmits a request signal to the CPU 118. If the CPU 118 determines that the user requires storage of the received video signal and/or audio signal in operation 203, the CPU 118 controls the compression and decompression unit 116 in the compression mode in operation 204. While not required in all aspects, the CPU 118 may determine whether the received video signal and/or audio signal are transmitted to the display unit 113 and/or the speaker 115, by a user request using the remote controller 130.

[0028] The CPU 118 transmits a storage command to the PC 140 through the USB controller 119 in operation 205 to store a received broadcast signal or video and/or audio signals, received from an external AV device, in the storage medium 143 included in the PC 140. While not required in all embodiments, predetermined information is transmitted and received between the PC 140 and the display apparatus 110 to effect this. The predetermined information is information used for setting an environment for transmitting and receiving a signal between the PC 140 and the display apparatus 110.

[0029] In operation 206, the CPU 118 sends video and/or audio signals, compressed by the compression and decompression unit 116, to the PC 140 using the USB controller 119 and the terminal 141. The compressed video and/or audio signals are either the broadcast signal, the video and/or audio signals, transmitted from the external AV device, or a signal selected by the user. If the user requires storage termination in operation 207, the CPU 118 terminates the storage operation. However, if the storage termination is not required in operation 207, the CPU 118 returns to operation 206 and continuously performs the storage operation until a signal requiring the storage termination is received.

[0030] If storage is not required in operation 203 and, if the user requires reproduction of a stored video and/or audio signal, stored on the storage medium 143 in operation 208, the CPU 118 controls the compression and decompression unit 116 to be set in decompression

mode in operation 209. The CPU 118 transmits a reproduction command to the PC 140 through the USB controller 119 in operation 210.

[0031] If video and/or audio signals are received from the PC 140 through the USB controller 119 in operation 211, the CPU 118 controls the compression and decompression unit 116 and the video signal processor 112 so that the received video and/or audio signals are restored by the compression and decompression unit 116, and displayed on the display 113 in operation 212.

[0032] If the user requires reproduction termination in operation 213, the CPU 118 terminates the reproduction operation. However, if the user does not require reproduction termination, the CPU 118 returns to operation 211 and continuously performs the reproduction operation until a signal requiring reproduction termination is received.

[0033] The USB controller 119 is controlled by the CPU 118 to transmit the compressed video and/or audio signals, transmitted from the compression and decompression unit 116 to the PC 140, and to transmit the compressed video and/or audio signals, transmitted from the PC 140 to the compression and decompression unit 116, according to a Universal Serial Bus (USB) standard. Also, the USB controller 119 transmits the storage request command or reproduction request command, transmitted from the CPU 118, to the PC 140. However, it is understood that protocols other than USB can be used.

[0034] The remote controller 130 is constructed so that a user can input his/her command with reference to the OSD information displayed on the display unit 113. However, it is to be understood that the controller 130 need not be used in all embodiments and that other input devices could be used. It is also to be understood that the OSD information can be displayed otherwise, such as on a display on the remote control 130 or a personal digital assistant.

[0035] The PC 140 comprises a USB terminal 141, a CPU 142 and the storage medium 143. The storage medium 143 is an external storage medium of the display apparatus 110. Accordingly, if a storage request command or a reproduction request command is received from the display apparatus 110 through the USB terminal 141, the storage request command or reproduction request command is transmitted to the CPU 142. Also, the signals communicated between the display apparatus 110 and the PC 140 for setting the environment for the storage or reproduction are transmitted to the CPU 142 through the USB terminal 141.

[0036] If the storage command is received and a compressed video and/or audio signal is received through the USB terminal 141, the received video and/or audio signal is processed by the CPU 142 and stored on the storage medium 143. However, if the reproduction command is received, the CPU 142 controls the storage medium 143 so that a video and/or audio signal, stored on the storage medium 143, is transmitted to the display

apparatus 110 through the USB terminal 141.

[0037] The PC 140 may be replaced by a digital camcorder, a personal digital assistant, digital player (such as an MP3 player), a memory card, or a video card, each including a USB terminal and a CPU. Also, the storage medium 143 may be a hard disk (HDD), or may be an optical medium, such as recordable compact discs (CDs), digital versatile discs (DVDs), Blu-ray discs, or advanced optical discs (AODs).

[0038] In the embodiment described above, the display apparatus 110 is controlled, and the environment for communicating signals between the display apparatus 110 and a PC 140 is set. A video and/or audio signal received through the video and/or audio signal receiving processor 111 is compressed and stored in real time on the storage medium 143, included in the PC 140, or a video and/or an audio signal, stored on the storage medium 143, is reproduced and decompressed. In this embodiment, the user can input a storage request or a reproduction request, with reference to OSD information, displayed on the display unit 113, or audio guide information output through the speaker 115.

[0039] Referring to Figure 3, in a second embodiment, the CPU 118 of the display apparatus 110 performs the storage or reproduction while directly controlling the storage medium 143, without the intervention of CPU 142, included in the PC 140. If a user input requires control of the storage medium 143 in operation 301, the CPU 118 forms a virtual file system (i.e. a system for managing the stored data) for the storage medium 143 in operation 302. The CPU 118 can download a file system managed by the CPU 142 of the PC 140 or stored on the storage medium 143 using the USB controller 119, and forms the virtual file system. However, the virtual file system can also be stored locally in the display apparatus 110.

[0040] The virtual file system is an abstraction of a physical file system and allows a consistent interface to multiple file systems, both local and remote, and allows a single directory to reference a number of diverse file system types as if the files were in a consistent file system type. However, it is understood that other file systems could be used so long as the file system, whether virtual or otherwise, allows the CPU 118 access to the stored audio and/or video data in the storage medium 143.

[0041] The CPU 118 generates management information for the storage medium 143 using the virtual file system (operation 303). The management information includes time information, corresponding to the storage capacity of the storage medium 143, and list information identifying the video and/or audio signals stored on the storage medium 143. The management information can be output as OSD information or as an audio signal.

[0042] In order to allow a user to control the storage medium 143, information that can be required or input by the user, as in operation 202 of Figure 2, can also be output as OSD information or as an audio signal. Also,

if a plurality of video signals and audio signals are stored on the storage medium 143, the list information includes index information for the plurality of video signals and audio signals. Accordingly, the user can select and reproduce a desired video and audio signal based on the list information. It is further understood that the information may include search results related to input received from a user.

[0043] If the user requires storage of the received video and/or audio signal in operation 304, the CPU 118 processes the compression and decompression unit 116 in a compression mode in operation 305. The CPU 118 controls the USB controller 119 so that the video and/or audio signal, compressed by the compression and decompression unit 116, is transmitted to the PC 140 through the USB controller 119 (operation 306). Accordingly, the storage medium 143 of the PC 140 stores the video and/or audio signal received through the USB terminal 141, without being processed by the CPU 142.

[0044] The compressed video and/or audio signal is a broadcast signal, a video and/or audio signal, transmitted from an external AV device, or a signal selected by a user. Also, when the video and/or audio signal is stored, the stored video and/or audio signal can be output to the display 113 and/or the speaker 115.

[0045] If the user requires storage termination in operation 307, the CPU 118 terminates the storage operation. However, if the user does not require the storage termination in operation 307, the CPU 118 returns to operation 306, and continuously stores the compressed video signal and/or audio signal until a signal requiring the storage termination is received.

[0046] If storage is not required in operation 304 and, if the user requires reproduction of a video and/or audio signal, stored on the storage medium 143, in operation 308, the CPU 118 sets the compression and decompression unit 116 in decompression mode in operation 309. The CPU 118 reads a video and/or audio signal from the storage medium 143 of the PC 140 through the USB controller 119 in operation 310. The CPU 118 decompresses the read video and/or the audio signal using the compression and decompression unit 116 and controls the video signal processor 112 to display the decompressed video and/or audio signal on the display unit 113. The reproduced video signals can be processed so that they are displayed together, such as in a PIP or PBP format, with video signals received through the video and audio signal receiving processor 111.

[0047] If the user requires reproduction termination in operation 312, the CPU 118 terminates the reproduction operation. However, if the user does not require reproduction termination, the CPU 118 returns to operation 310 and continuously performs the reproduction operation until a signal requiring the reproduction termination is received.

[0048] Referring to Figure 4, another system comprises an antenna 400, a display apparatus 410, a remote controller 430 and a storage and reproduction unit 440.

The antenna 400 and the remote controller 430 are generally the same as the antenna 100 and the remote controller 130 described with reference to Figure 1. The display apparatus 410 is constructed so that a video and/or an audio signal is stored or reproduced without compression or restoration.

[0049] The display apparatus 410 comprises a video and audio signal receiving processor 411, a video signal processor 412, a display unit 413, an audio signal processor 414, a speaker 415, an information receiver 417, a CPU 418, an USB controller 419 and an OSD information generator 420. The video and audio signal receiving processor 411 receives video and/or audio signals from the antenna 400 or an external AV device (not shown). The video and audio signal receiving processor 411 is controlled by the CPU 418 and outputs received video signals to the video signal processor 412 and/or the USB controller 419. The video and audio signal receiving processor 411 is controlled by the CPU 418 and outputs received audio signals to the audio signal processor 414 and/or the USB controller 419.

[0050] The video signal processor 412, the display unit 413, the audio signal processor 414, the speaker 415, the information receiver 417 and the OSD information generator 420 operate in the same or a similar manner as the video signal processor 112, the display unit 113, the audio signal processor 114, the speaker 115, the information receiver 117 and the OSD information generator 120 described above with reference to Figure 1.

[0051] When a received video and/or an audio signal is stored, the USB controller 419 is controlled by the CPU 418 and transmits the video and/or the audio signal, output from the video and audio signal receiving processor 411, to the storage and reproduction unit 440. Also, when a video and/or audio signal, stored on the storage medium 442, is reproduced, the USB controller 419 outputs the video signal transmitted from the storage and reproduction unit 440 to the video signal processor 412 and outputs the audio signal transmitted from the storage and reproduction unit 440 to the audio signal processor 414. As such, no further compression or decompression is performed on the received signal unless the received signal is received in compressed form and no further decompression is required except using the processors 412, 414.

[0052] While not required in all aspects, the method of Figure 5, which illustrates the operation of the system shown in Figure 4, can be implemented as computer software usable by the CPU 418.

[0053] Referring to Figure 5, if a user desires to control the storage medium 442 in operation 501, the CPU 418 forms a virtual file system for the storage medium 442 in operation 502. The CPU 418 downloads a file system stored on the storage medium 442 using the USB controller 419 and forms the virtual file system using the downloaded file system. However, it is understood that such a virtual file system can also be stored

in the display 410 and that the file system can be obtained otherwise than from the storage medium 442.

[0054] Then, the CPU 418 generates management information for the storage medium 442 using the virtual file system in operation 503. The management information includes time information corresponding to the storage capacity of the storage medium 442, and list information of a video signal and/or an audio signal stored on the storage medium 442. The management information can be output as OSD information or as an audio signal.

[0055] For enabling the user to control the storage medium 442, information that can be required or input by the user can also be output as OSD information or as an audio signal. Also, if a plurality of video signals and audio signals are stored on the storage medium 442, the list information includes index information for the plurality of video signals and audio signals. Accordingly, the user can select and reproduce a desired video signal and audio signal based on the list information. It is further understood that the information may include search results related to input received from a user.

[0056] If the user requires storage of the received video signal and/or audio signal in operation 504, the CPU 418 controls the display apparatus 410 so that the video and/or audio signal output from the video and audio signal receiving processor 411 is transmitted to the storage and reproduction unit 440 through the USB controller 419 (operation 505). The storage and reproduction unit 440 stores the video and/or audio signal received through the USB terminal 441, in the storage medium 442. When video and/or audio signals are stored on the storage medium 442, the stored video signal and/or audio signal can be output to the display unit 413 and/or the speaker 415.

[0057] If storage termination is required in operation 506, the CPU 418 terminates the storage operation. However, if the storage termination is not required in operation 506, the CPU 418 returns to operation 505 and continuously transmits the received video signal and/or audio signal to the storage and reproduction unit until a signal requiring storage termination is received.

[0058] If storage is not required in operation 504 and the user requires reproduction of a video and/or audio signal, stored on the storage medium 442, in operation 507, the CPU 418 reads the video and/or audio signal from the storage medium 442 of the storage and reproduction unit 440 using the USB controller 419 in operation 508. If a plurality of video and/or audio signals are stored on the storage medium 442, the read video and/or audio signal may be one among the plurality of video and/or audio signals.

[0059] The CPU 418 controls the display apparatus 410 so that the read video and/or audio signal is transmitted to the video signal processor 412 and the audio signal processor 414, respectively (operation 509). Accordingly, the display unit 413 and the speaker 415 output a reproduced video and audio signal, respectively.

The reproduced video signal can be displayed together, such as in a PIP or PBP format, with the video signal received through the video and audio signal receiving processor 411.

[0060] If the user requires the reproduction termination in operation 510, the CPU 418 terminates the reproduction operation. However, if the user does not require reproduction termination, the CPU 418 returns to operation 508 and continuously performs the reproduction operation until a signal requiring the reproduction termination is received.

[0061] It is understood that the storage and reproduction unit 440 of Figure 4 may be a memory card without a CPU. However, the unit 440 can also include a CPU which is not used during the recording and/or reproduction. If the storage and reproduction unit 440 receives a video and/or audio signal through the USB terminal 441, the storage and reproduction unit 440 stores the received video signal and/or audio signal in the storage medium 442. Also, the storage and reproduction unit 440 outputs a video signal and/or audio signal stored on the storage medium 442 through the USB terminal 441. Such storage and reproduction through the storage medium 442 are controlled by the CPU 418 using the virtual file system formed in the CPU 418.

[0062] As described above, according to an aspect of the present invention, it is possible to store a received video and audio signal in a storage medium included in a PC or other electronic device, and to reproduce a signal therefrom, by operating only a display apparatus without controlling the PC connected to the display apparatus. Therefore, a user does not need to operate the PC individually, in order to store and reproduce the video and audio signal received through the display apparatus. Also, according to an aspect of the invention, the user does not need to download related programs to the PC or mount a board such as a television integration board separately in the PC, for signal storage and reproduction. Additionally, according to an aspect of the invention, a storage and reproduction unit that includes a USB terminal without a PC can store and reproduce a video and/or audio signal received through a display apparatus. Further, according to an aspect of the invention, it is possible to improve a storage capacity of a storage medium by compressing a received video and audio signal in a display apparatus and transmitting the result to the external storage medium. Moreover, according to an aspect of the invention, it is possible to provide various storage and reproduction environments to users since a user can select a display format of a video signal to be stored or reproduced.

[0063] While not required in all aspects, it is understood that the controller can be computer implementing the method using the computer program encoded on a computer readable medium. The computer can be implemented as a chip having firmware, or can be a general or special purpose computer programmable to perform the method. Additionally, while described in terms

of a display apparatus, it is understood that the invention can be used with an apparatus that reproduces other received signals without displaying video signals, such as audio receivers, or an apparatus that receives audio data and other data (such as image data and/or text information) to be displayed. It is further understood that the signal can be reproduced from the external storage medium while recording the received signal on the external storage medium.

Claims

1. A display apparatus comprising:

an audio and/or video signal input means;
audio and/or video processing means (111, 112, 114, 116; 411, 412, 414) for processing audio and/or video signals from the audio and/or video signal input means to produce a perceivable output;
control means (118; 418); and
user input means (130, 117; 430, 417),

characterised by

an interface (119; 419) for providing access to an external storage means (140; 440),

the audio and/or video processing means (111, 112, 114, 116; 411, 412, 414) being configured for providing audio and/or video signals to the interface (119; 419) and to receive audio and/or video signals from the interface (119; 419), and

the control means (118; 418) being responsive to operation of the user input means (130, 117; 430, 417) to effect transfer of audio and/or video signals to and from the audio and/or video processing means (111, 112, 114, 116; 411, 412, 414) through the interface (119; 419).

2. An apparatus according to claim 1, wherein the control means (418) comprises a computer running an operating system program which enables the control means to mount an external filesystem via the interface (419).

3. An apparatus according to claim 1 or 2, wherein audio and/or video processing means (111, 112, 114, 116; 411, 412, 414) includes television receiving means (111).

4. A dual purpose television and computer monitor apparatus, the apparatus being in accordance with claim 3.

5. A display system comprising an apparatus (110; 410) according to any one of claims 1 to 4 and a storage means (140; 440) communicatively connectable to said interface (110; 410) for the trans-

mission and reception of audio and/or video signals.

6. A display apparatus connected with an external storage medium disposed external to the display apparatus, the apparatus comprising:

a receiving processor that receives a video signal and/or an audio signal;
a controller that, if a user requires storage of the received video signal and/or audio signal, stores in real time the video signal and/or audio signal received through the receiving processor in the external storage medium, and, if the user requires reproduction of the video signal and/or audio signal stored on the external storage medium, reproduces the stored video signal and/or audio signal stored on the external storage medium; and
an output unit that outputs the reproduced video signal and/or audio signal.

7. The display apparatus of claim 6, wherein the controller, according to a request from the user and when the received video signal and/or audio signal are stored on the external storage medium, determines whether the received video signal and/or audio signal is to be output through the output unit.

8. The display apparatus of claim 6, wherein the receiving processor receives a broadcasting signal including the video signal and/or the audio signal, or the video signal and/or an audio signal provided from an external audio/video (AV) device.

9. The display apparatus of claim 8, wherein, when the received video signal and/or audio signal is output in real time using the output unit, the controller controls the storage or reproduction with respect to the external storage medium.

10. The display apparatus of claim 9, wherein, when the video signal and/or audio signal are reproduced from the external storage medium, the controller displays the reproduced video signal and the received video signal output in real time together on the output unit in a Picture-In-Picture format or in a Picture-By-Picture format.

11. The display apparatus of claim 6, wherein if an input of the user requires control of the external storage medium, the controller outputs management information through the output unit, and uses the management information to manage the storage or reproduction of the received video signal and/or audio signal with respect to the external storage.

12. The display apparatus of claim 11, wherein the output unit comprises:

a display unit to display the received video signal and the video signal reproduced from the external storage medium; and
a speaker to output the received audio signal and/or the audio signal reproduced from the external storage medium.

13. The display apparatus of claim 12, wherein the management information for stored video signal and/or the audio signal stored on the external storage medium is displayed in an on-screen display format on the display unit.

14. The display apparatus of claim 12, wherein the management information for stored video signal and/or the audio signal stored on the external storage medium is output as an audio signal through the speaker.

15. The display apparatus of claim 13, wherein the management information comprises time information corresponding to a storage capacity of the external storage medium, and a list including the stored video signal and/or audio signal and additional video signals and/or audio signals stored on the external storage medium.

16. The display apparatus of claim 13, wherein the reproduced video signal and/or the audio signal are a selected video signal and/or an audio signal selected from a plurality of reproducible video signals and/or audio signals stored on the external storage medium and which is selected by a user with reference to the management information.

17. The display apparatus of claim 6, wherein when an input of the user requires control of the external storage medium, the controller outputs through the output unit information that the user can input as a storage request or a reproduction request.

18. A display apparatus connected with an external storage medium, the apparatus comprising:

a receiving processor to receive a video signal and/or an audio signal; a controller that forms a virtual file system for the external storage medium,
if a user requires storage of the received video signal and/or audio signal, stores the video signal and/or audio signal received through the receiving processor in the external storage medium in real time with reference to information generated on the basis of the formed virtual file system, and if the user requires reproduction of the video signal and/or audio signal stored on the external storage medium, reproduces the stored video signal and/or an audio signal from

the external storage medium with reference to the information generated on the basis of the virtual file system; and
an output unit, to output the reproduced video signal and/or audio signal.

19. The display apparatus of claim 18, wherein the controller downloads a file system stored on the external storage medium and uses the downloaded file system to form the virtual file system.

20. The display apparatus of claim 18, wherein the controller controls the storage or the reproduction to output the video signal and/or audio signal received through the receiving processor to the output unit in real time.

21. The display apparatus of claim 18, wherein the information generated on the basis of the virtual file system comprises management information for the external storage medium.

22. The display apparatus of claim 21, wherein the management information comprises time information corresponding to a storage capacity of the external storage medium, and a list including the stored video signal and/or the audio signal and additional video and/or audio signals stored on the external storage medium.

23. The display apparatus of claim 22, wherein the controller generates the management information so that the management information is output in an on-screen display format through the output unit.

24. The display apparatus of claim 22, wherein, when the video signal and/or the audio signal are reproduced from the external storage medium, the controller displays the video signal reproduced from the external storage medium and the received video signal together using the output unit in a Picture-In-Picture format or in a Picture-By-Picture format.

25. A display apparatus connected with an external storage medium, the apparatus comprising:

a receiving processor that receives a video signal and/or an audio signal;
a compression and decompression unit that if a user requires storing of the received video signal and/or audio signal, is set to a compression mode, and compresses the video signal and/or the audio signal received from the receiving processor, and
if the user requires reproduction of the video signal and/or audio signal stored on the external storage medium, is set to a decompression mode, and restores the video signal and/or the

audio signal received from an external storage medium;
an output unit to output the reproduced video signal and/or audio signal; and

a controller that

if the user requires the storage, controls the compression and decompression unit in the compression mode and stores the compressed video signal and/or audio signal compressed by the compression and decompression unit in the external storage medium in real time, and

if the user requires the reproduction, outputs the video signal and/or audio signal from the external storage medium to the output unit through the compression and decompression unit.

26. The display apparatus of claim 25, wherein the controller forms a virtual file system for the external storage medium, and controls the storage or reproduction of the video and/or audio signals with respect to the external storage medium using the virtual file system.

27. The display apparatus of claim 26, wherein the controller downloads a file system stored on the external storage medium and forms the virtual file system using the downloaded file system.

28. The display apparatus of claim 26, wherein the controller forms the virtual file system if an input of the user requires control of the external storage medium.

29. The display apparatus of claim 25, wherein the controller generates management information for managing the stored video signal and/or the audio signal on the external storage medium using the virtual file system; and outputs the management information to the output unit.

30. The display apparatus of claim 29, wherein the controller generates the management information so that the management information is displayed in an on-screen display format on the output unit.

31. The display apparatus of claim 29, wherein the management information comprises time information corresponding to a storage capacity of the external storage medium, and a list including the stored video signal and/or audio signal and additional video and/or audio signals stored on the external storage medium.

32. The display apparatus of claim 25, wherein, when the received video signal and audio signal are output through the output unit in real time, the controller controls the storage or reproduction of the received

video signal and/or the audio signal with respect to the external storage medium.

33. The display apparatus of claim 32, wherein, when the video signal and/or the audio signal are reproduced from the external storage medium, the controller displays the video signal restored from the compression and decompression unit and the received video signal together on the output unit in a Picture-In-Picture format or in a Picture-By-Picture format.
34. The display apparatus of claim 25, wherein, according to a request of the user and when the received video signal and/or audio signal are stored on the external storage medium, the controller determines whether the received video signal and/or audio signal is to be output using the output unit.
35. A method of operating a display apparatus connected with an external storage medium disposed external to the display apparatus, the method comprising:
 - receiving a video signal and/or an audio signal in the display apparatus;
 - storing the received video signal and/or audio signal on the external storage medium in real time, if a user requires storage of the received video signal and/or audio signal; and
 - reading and reproducing the stored video signal and/or audio signal from the external storage medium, if the user requires reproduction of the video signal and/or audio signal stored on the external storage medium.
36. The method of claim 35, further comprising:
 - forming a virtual file system for the external storage medium;
 - generating management information for the external storage medium using the virtual file system; and
 - providing the generated management information to the user before the user requires the storage or the reproduction of the received video signal and/or audio signal.
37. The method of claim 36, wherein the forming the virtual file system is performed if an input of the user requires control of the external storage medium by the display apparatus.
38. The method of claim 37, wherein the virtual file system is formed by downloading a file system stored on the external storage medium to the display apparatus, and forming the virtual file system using the downloaded file system.
39. The method of claim 36, further comprising outputting the management information in an on-screen display format.
40. The method of claim 39, wherein the reading and reproducing comprises receiving a user selection indicating that the user requires reproduction of one video signal and/or audio signal selected from among a plurality of reproducible video signals and/or audio signals stored on the external storage medium with reference to the management information output in the on-screen display format.
41. The method of claim 36, wherein the management information comprises time information corresponding to a storage capacity of the external storage medium, and a list including the received video signal and/or audio signal and additional video signal and/or audio signals stored on the external storage medium.
42. The method of claim 35, wherein further comprising outputting the received video signal and/or audio signal in real time through the display apparatus during the storing and/or reading and reproducing the received video and/or audio signals with respect to the external storage medium.
43. The method of claim 42, wherein the reproduction is performed so that the received video signal being output in real time and the video signal reproduced from the external storage medium are displayed together in a Picture-In-Picture format or in a Picture-By-Picture format.
44. The method of claim 35, wherein, according to a request from the user and when the received video signal and/or the audio signal are stored, it is determined whether the received video signal and/or audio signal is to be output through the display unit.
45. The method of claim 36, wherein the providing the generated management information comprising providing information required by the user for use by the user in controlling the external storage medium.
46. A method of operating a display apparatus connected with an external storage medium disposed external to the display apparatus, the method comprising:
 - receiving a video signal and/or audio signal at the display apparatus;
 - compressing the received video signal and/or the audio signal, if a user requires storage of the received video signal and/or the audio signal;

storing the compressed video signal and/or audio signal in the external storage medium in real time; and

restoring the stored and/or compressed video and/or audio signal stored on the external storage medium, when the user requires reproduction of the video signal and/or audio signal using the display apparatus; and
outputting the restored video signal and/or audio signal using the display apparatus.

the received video signal and/or audio signal on the external storage medium through the interface.

47. The method of claim 46, further comprising:

forming a virtual file system for the external storage medium; and
outputting management information for the external storage medium generated on the basis of the virtual file system, before the compression or the restoration is performed.

48. The method of claim 47, wherein the storing or the restoring the compressed video and/or audio signal comprises the user requiring the storage or the reproduction of the compressed video and/or audio signal with reference to the output management information.

49. The method of claim 47, wherein the forming the virtual file system is performed if an input of the user requires control of the external storage medium.

50. The display apparatus of claim 6, further comprising a housing which houses the receiving processor, the controller, and the output unit and which has an interface, wherein the external storage medium is external to the housing, and the controller controls the interface to transmit the received video signal and/or audio signal through the interface to the external storage medium to be stored.

51. The display apparatus of claim 50, wherein the interface is a Universal Serial Bus (USB) interface.

52. The display apparatus of claim 50, further comprising an external storage device includes the external storage medium and another controller which controls storage and retrieval of data including the received video signal and/or audio signal with respect to the external storage medium,

wherein the controller sends instructions through the interface to instruct the another controller to store the received video signal and/or audio signal on the external storage medium.

53. The display apparatus of claim 50, further comprising an external storage device includes the external storage medium,

wherein the controller controls the storage of

FIG. 1

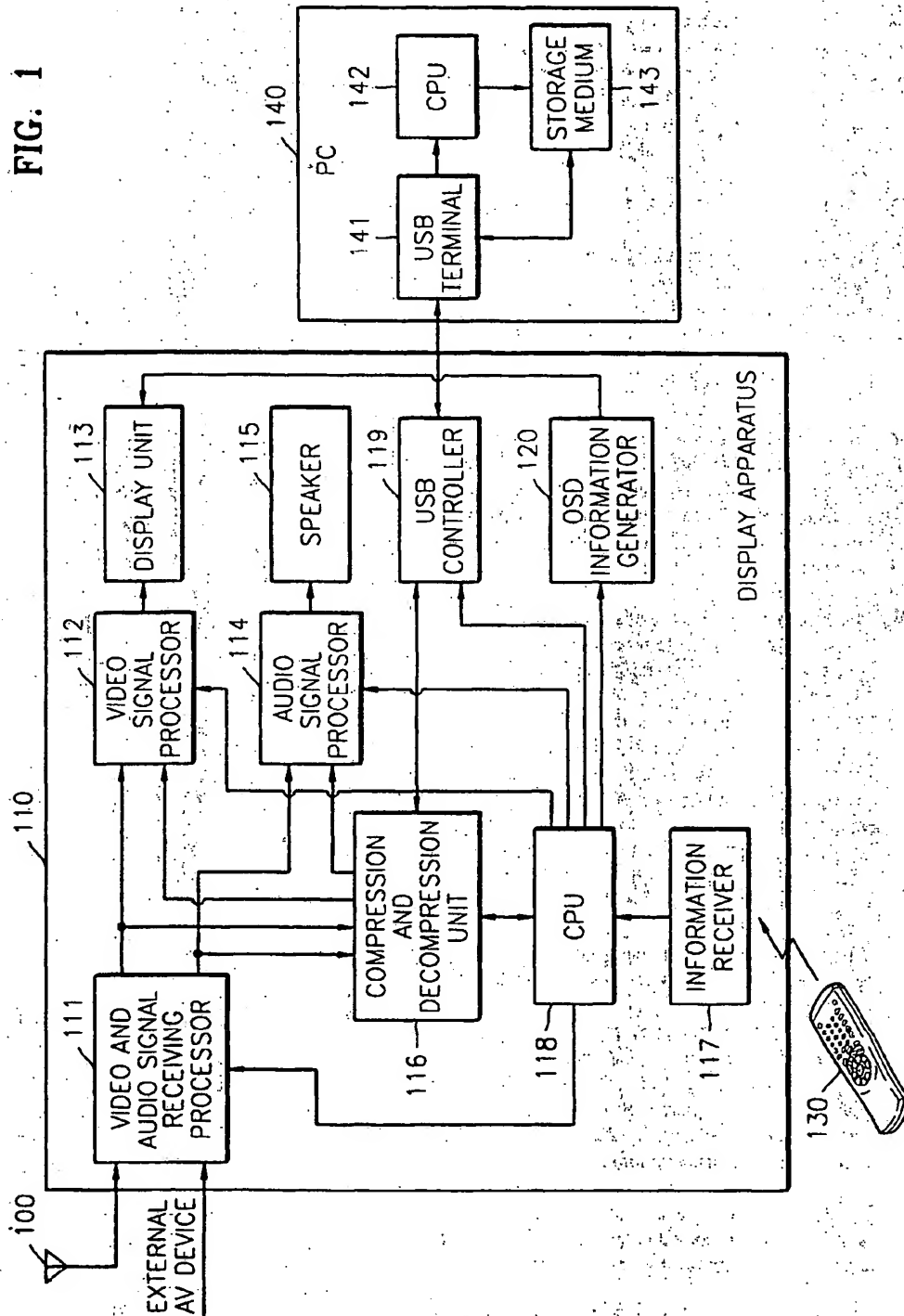


FIG. 2

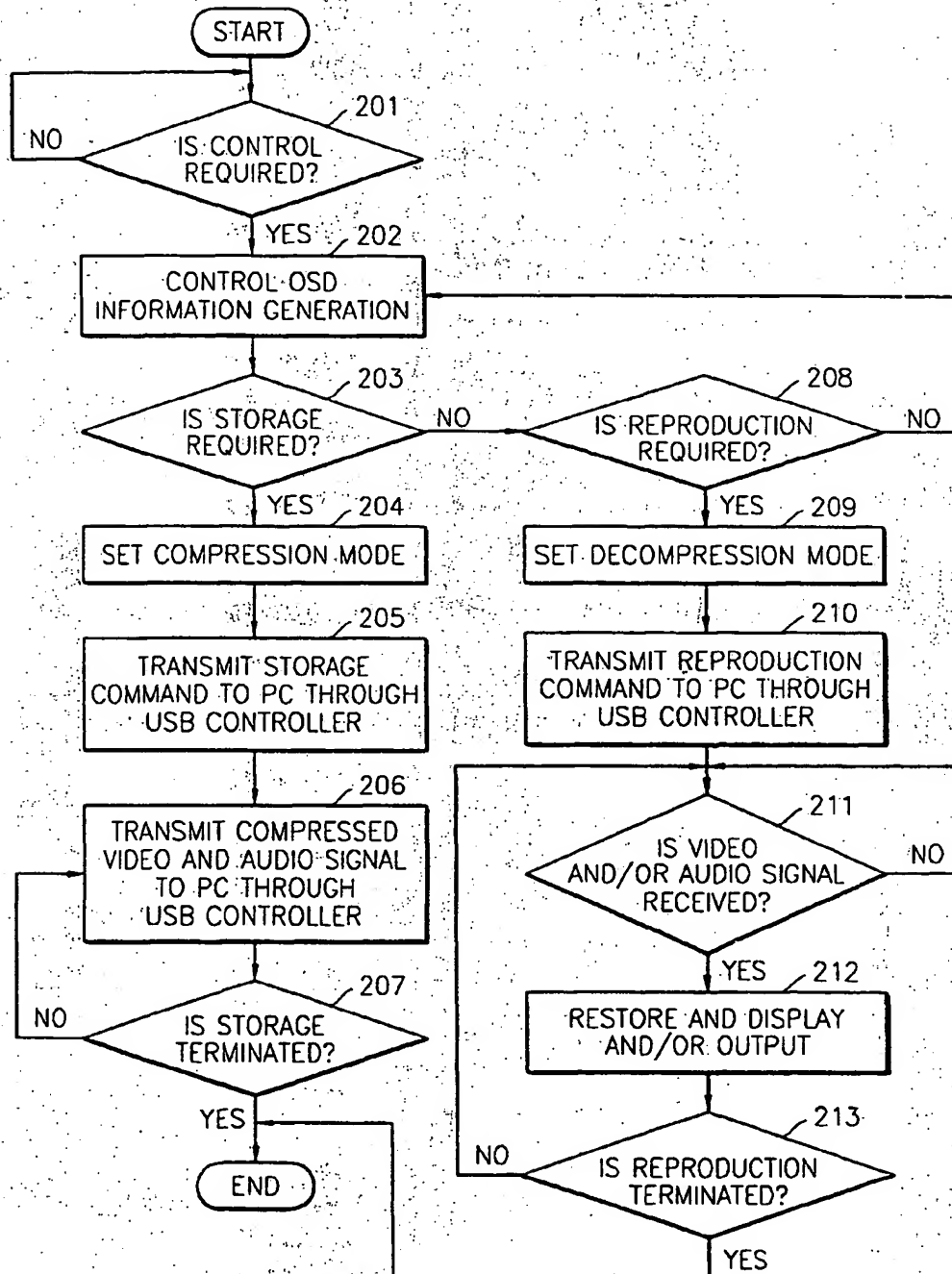


FIG. 3

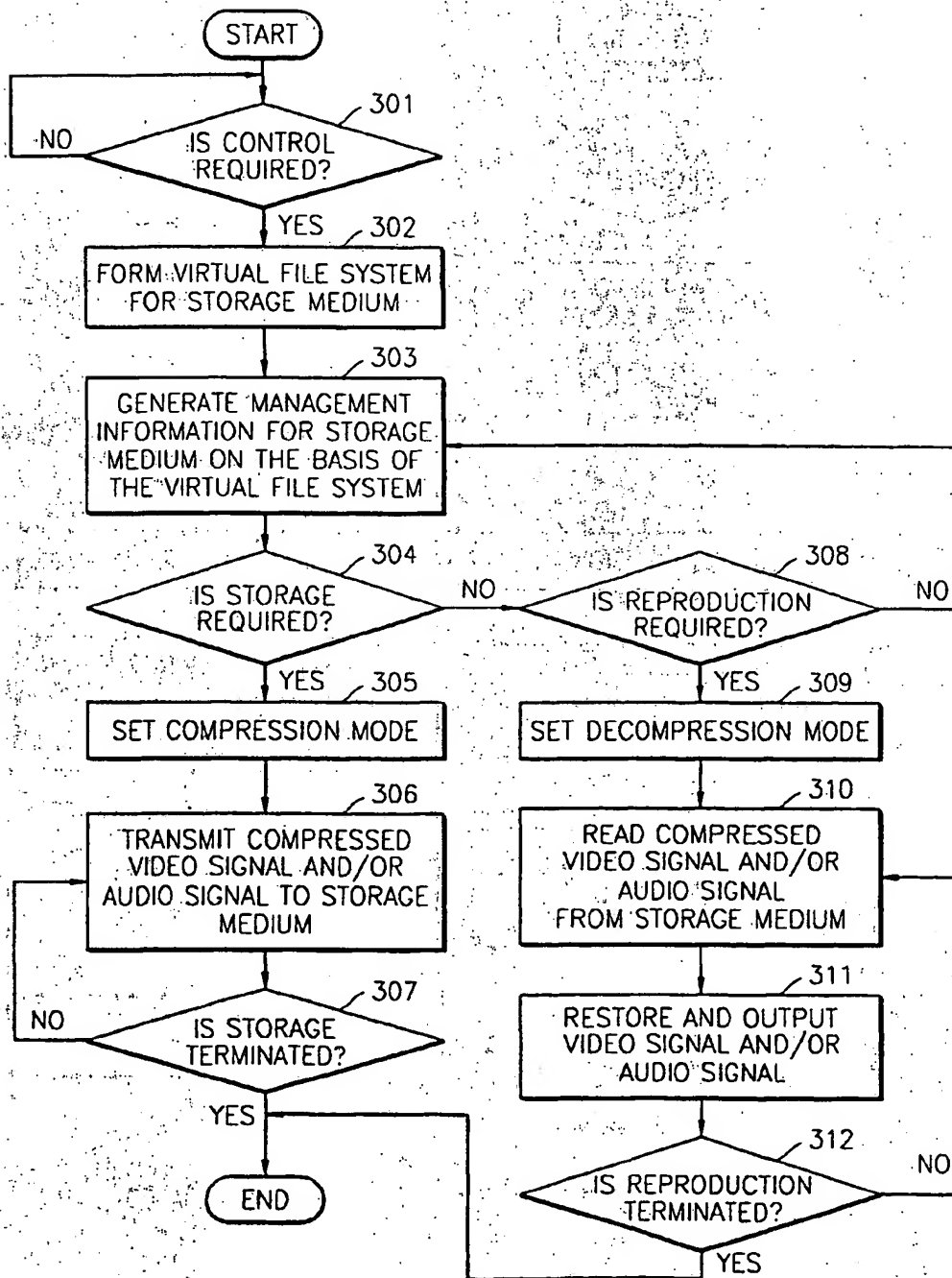


FIG. 4

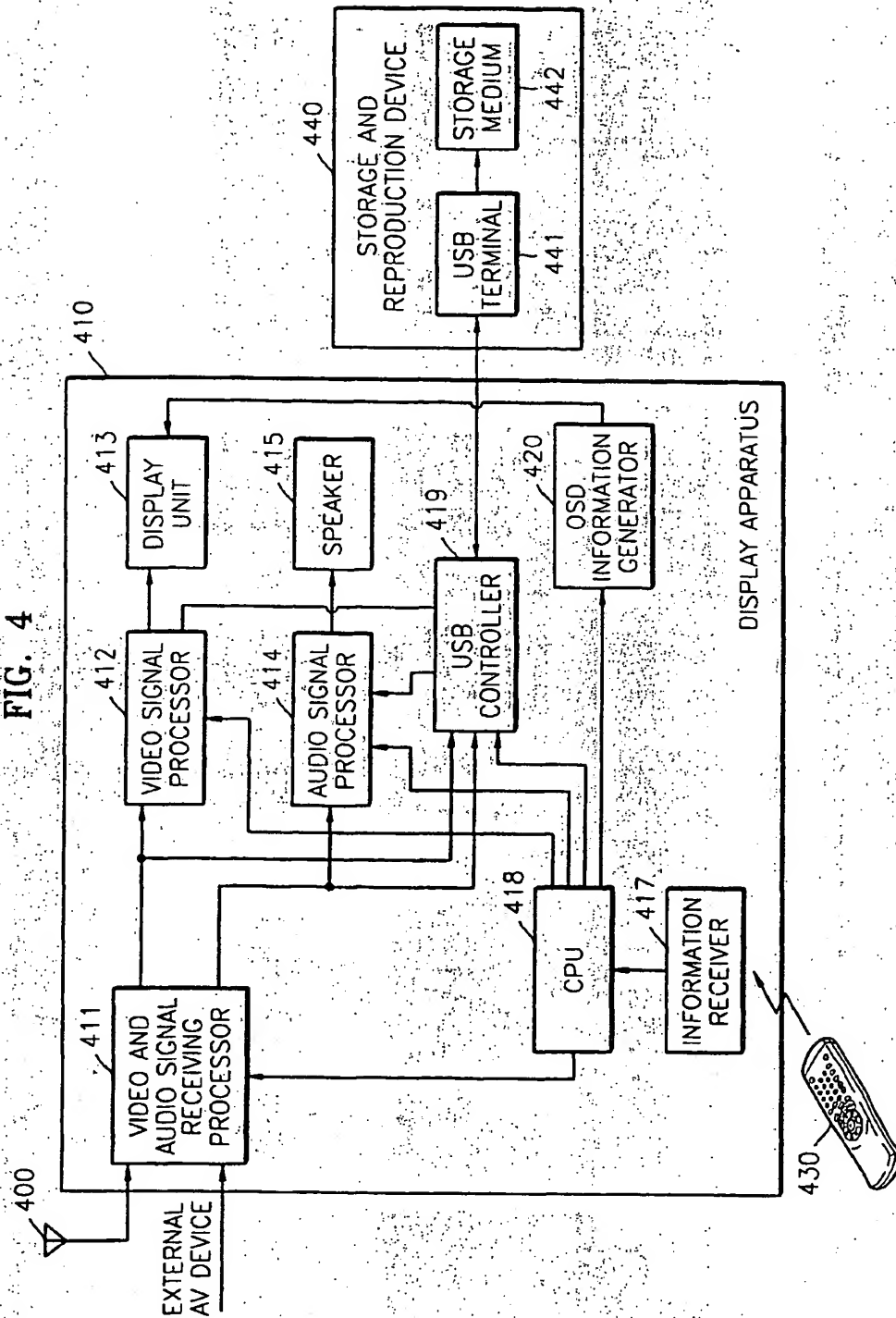
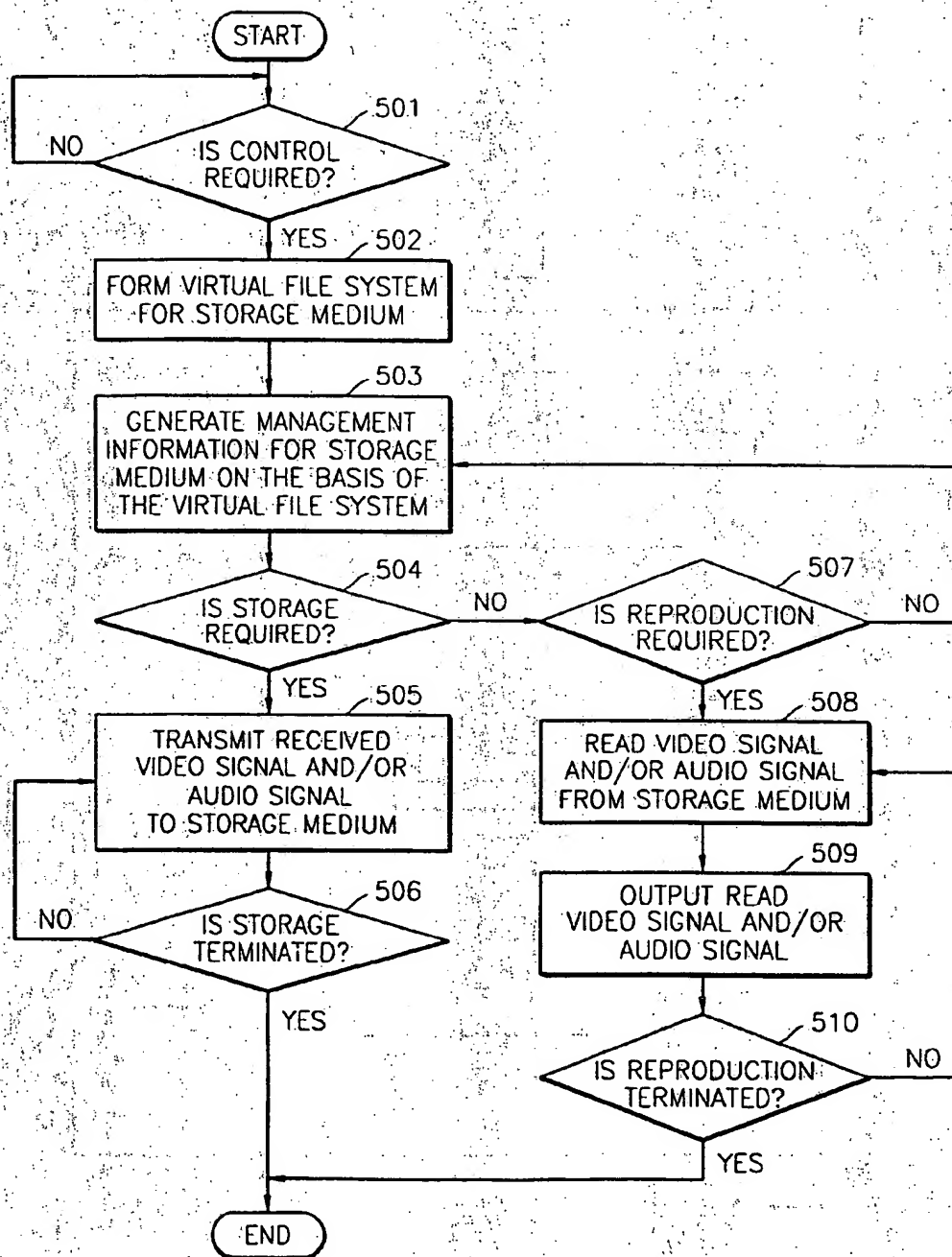


FIG. 5



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